

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
29 December 2004 (29.12.2004)

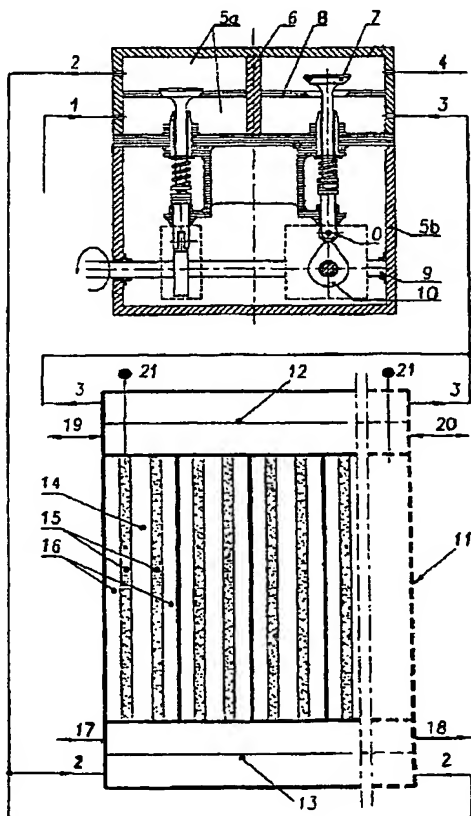
PCT

(10) International Publication Number  
**WO 2004/113590 A2**

- (51) International Patent Classification<sup>7</sup>: **C25B** (74) Agent: GERVASI, Gemma; Notarbartolo & Gervasi S.p.A., Corso di Porta Vittoria 9, I-20122 Milan (IT).
- (21) International Application Number: PCT/EP2004/051207 (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (22) International Filing Date: 23 June 2004 (23.06.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: PV2003A000006 24 June 2003 (24.06.2003) IT (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
- (71) Applicant and  
(72) Inventor: MELOSI, Mario [IT/IT]; Via Porta Marica 4, I-27100 Pavia (IT).

[Continued on next page]

(54) Title: ELECTROCHEMICAL THERMODYNAMO



(57) Abstract: Electrochemical cells modules made up of couples of catalytic multilayer porous electrodes forming the anodes and the cathodes and delimitating external gaseous areas and internal areas containing the electrolyte wherein the pressure modulators, generating two pressure cycles independently synchronized but of opposite phase, act at the inlet and at the outlet of the electrolyte and the multilayer porous electrodes are weeping on the gas side. According to a preferred embodiment the multilayer porous electrodes are hydrophobic and conductive on the gas side, the conductive and catalytic middle layers are hydrophobic and hydrophilic, the non-conductive and non-catalytic layer on the electrolyte side is hydrophilic. Furthermore, the present invention provides the electrochemical process using the above described electrochemical cell according to which the gas is maintained at a pressure  $P$  up to 200 bar, the electrolyte pressure is varied stepwise between  $P+dP$  and  $P-dp$  by generating on the electrolyte positive pressure waves of amplitude  $dP$  and  $dp$  at the frequency  $f$ .

BEST AVAILABLE COPY



FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

- *without international search report and to be republished upon receipt of that report*